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ABSTRACT

The novelty of deaf student teachers teaching normal ninth grade biology classes may increase motivation to learn subject matter if sign language lessons are oriented toward specific kinds of knowledge. Since Gallaudet University (Washington, D.C.) places deaf undergraduate student teachers in schools with normal hearing students, the effects of this interaction can be studied so the program can better serve both students and deaf student teachers. This study investigated the impact of sign language lessons by a black deaf student teacher, using an interpreter, on the achievement scores of ninth grade biology classes. Students were also given an attitude questionnaire at the end of the 8-week study. The study indicates that deaf student teachers, when teaching normal hearing students, should give sign language lessons at the beginning of each class period and these sign language lessons should be carefully prepared as a tool to interact with students regarding subject matter. The lessons may improve personal relationships more than increase achievement. Appendices include hand sign language aids, an achievement test sample and questionnaires. (Author/CW)

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THE EFFECTS OF SIGN LANGUAGE LESSONS BY A DEAF STUDENT TEACHER, WHO USES AN INTERPRETER, ON THE PERCEPTION AND ACHIEVEMENT OF NORMAL HEARING NINTH GRADE MULTICULTURAL BIOLOGY CLASSES

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A Research Paper Submitted to

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April 1988

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April 1988

Abstract

This study investigated the impact of sign language lessons by a black deaf student teacher, using an interpreter, on the achievement scores of ninth grade biology classes. It also inquired into the students perception of the effects of sign language on biology achievement and personal relationships. These are important areas to study since many students at this level are difficult to motivate. The novelty of deaf student teachers teaching normal hearing ninth grade biology classes may increase motivation to learn subject matter if sign language lessons are oriented toward specific kinds of knowledge. Since Gallaudet University of Washington D.C. places their deaf undergraduate student teachers in local schools with normal hearing students, the effects of this interaction on students should be studied so the program may better serve both students and deaf student teachers.

The sample used for this study consisted of students enrolled in two different classes of ninth grade biology at a local junior high school. The student teachers two classes were randomly selected as control and experimental groups. The student teacher attempted to motivate students in the experimental group by giving sign language lessons at the beginning or at the end of each class. Control group

students were given no sign language lessons.

The study lasted approximately eight weeks. The student teacher took full responsibility during the last three weeks.

Control and experimental groups were statistically compared in this quasi-experimental study.

Statistical analysis of the pre-test (covariate) and post-test achievement test scores showed no significant increase of the experimental group over the control group, although an insignificant increase of the experimental group over the control group was found. This indicated significant increases may be found if the program was of greater longevity.

A separate post-hoc study indicated that there was a significant increase in achievement of black females over both black males and white females. Since these effects were not attributed to the sign language lessons they may have been due to the black student teacher and/or the sign language method of teaching used by the deaf student teacher. This indicated a need for further study in this area.

A questionnaire was given to the experimental group regarding the effects of sign language lessons on eleven different variables. This questionnaire was given at the end of the study. Results indicated black males had significantly different perceptions of the deaf black student teacher than other grouped categories of students, regarding the effectiveness of the sign language lessons. They rated the effectiveness lower in practically all of the eleven questions on the questionnaire when compared to the other categories of students, as well as all experimental students combined.

Average responses for all students on the questionnaire showed

students valued sign language lessons highly when related to developing personal relationships. Due to a lack of time, students felt sign language lessons did not add to their biology achievement. Overall, experimental perceptions agreed with achievement which indicated students had a good understanding of the cause-effect relationship.

The study consisted of eighteen students in the experimental group and thirteen students in the control group. There were seven black males, seven black females, nine white males, and eight white females in the two groups combined.

This study contains empirical data which may be of value to motivation program developers in schools.

The study indicates that deaf student teachers, when teaching normal hearing students, should give sign language lessons at the beginning of each class period. These sign language lessons should be carefully prepared as a tool to interact with students, regarding subject matter. The lessons may improve personal relationships more than increase achievement. Similar studies should be conducted to check for achievement. Such studies should be of greater longevity.

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CHAPTER I

INTRODUCTION, STATEMENT OF THE PROBLEM, HYPOTHESIS, AND ORGANIZATION OF STUDY

Introduction

Since Gallaudet University in Washington D.C. requires its deaf students to successfully complete eight weeks of student teaching in schools with normal hearing students, strategies must be developed by deaf student teachers aimed at continuous improvement in student motivation.

Since, according to Maslow, achievement itself is a motivator, students may never fully reach this motivation level unless strategies are developed by educators to help high school students achieve in academic areas.[1]

Maslow stated that psychologically healthy people have satisfied their needs for safety, love, and esteem. Once these needs are satisfied Maslow believes individuals are motivated.[2]

By taking a negative attitude a student can protect ones self esteem, maintaining that one is a good student by rationalizing that the reason for no achievement is not because of a lack of ability but because of a lack of being interested enough to try.[3]

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[1] Robert S. Zais, Curriculum (New York: Thomas Y. Crowell Company, 1976), p. 221.

[2] Abraham H. Maslow, Toward a Psychology of Being (New York: D. Van Nostrand Company, 1962), p. 23.

[3] Lewis Paddy, Significant Others, Self Concept of Ability, and Achievement (San Francisco: ERIC Document Reproduction Service, ED 128 699, 1973), p. 7.

Students have strong psychological needs for being in the kind of classroom where they can survive. To some students biology may mean less than nothing. It will be the self esteem, freedoms, growing adequacy, and stimulation from rewarding activities that are important.[4]

Giving sign language lessons to the experimental group was an attempt to use a stragegy to make subject matter interaction more stimulating for the students. This motivational element was designed to increase achievement scores significantly. Thus, the activity was designed to adapt to the students intrinsic needs, rather than the students adapting to the activity.

Statement of the Problem

This study investigated the effects of sign language lessons on achievement scores of a ninth grade biology class.

The variables to be defined are: deaf student teacher, interpreter, sign language lessons, perception, achievement scores, normal hearing ninth grade multi-cultural biology classes. Operational definitions for these six variables are:

1. The deaf student teacher is a black male from Gallaudet University in Washington D.C. He was twenty four years of age and was a senior that was finishing the requirements for a Bachelor of Science Degree. He was a citizen of the Country of Zambia in Africa.

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[4] Herbert A. Thelen, Education and the Human Quest (New York: Harper and Row, 1960), pp. 147-148.

2. The interpreter was a qualified sign language interpreter, hired by Gallaudet, and used by the deaf student teacher to communicate with students and associates. The female interpreter would usually stand at the back of the class. She would interpret the student teachers signs and verbally communicate her interpretation to the students. Responses by students were relayed by the interpreter to the student teacher by use of sign language.

3. The sign language lessons were interactions with the students regarding signs that would be used during the subject matter lesson. Students were encouraged to ask questions such as "what is the sign for biology"? Pamphlets and copies of the American Manual Alphabet (fingerspelling) were given to experimental group students. Copies of typical pages in the pamphlet, and the American Manual Alphabet are attached in Appendix B.

4. Perception on the effectiveness of sign language lessons to the experimental group was measured on a questionnaire containing eleven questions of either a personal or subject matter nature. The responses were correlated, regarding subgroups of males, females, blacks, and whites, using the Product Moment Correlation (Pearson r).

5. Achievement scores are scores made by biology students on a specially prepared achievement test on the material covered during the student teachers unit of teaching. A covariate was used to equate the post-test scores for initial differences. The covariate consisted of the average of the four major test scores, of the participants, prior to the beginning of the student teachers appearance at the school. Both the covariate and achievement test were administered to control and experimental groups at the appropriate

Times. Comparison of scores between experimental and control groups indicate effectiveness of sign language lessons. The Analysis of Covariance was the statistic used for this comparison.

6. Normal hearing ninth grade multi-cultural biology classes are ninth grade students, without hearing defects, taking biology in a multi-cultural school. Of the thirty one total students in control and experimental groups, there were seven black males, seven black females, nine white males, and eight white females.

The relationship investigated between the variables was cause-effect. The purpose of the study was to determine if sign language lessons (the cause) produced a significant increase on achievement scores (the effect).

Hypothesis

Based on Maslow's Theory and sign language stimulation, as a motivator to interact with subject matter, it was assumed:

1. Experimental groups students would show significant increases in achievement over control group students.

Organization of the Study

Chapter I has dealt with the introduction and statement of the problem. This chapter stresses a need for the development of motivation strategies to increase achievement scores of students in academic areas. Sign language lessons were used in this study to try to motivate students. The goal was to produce significant increases in achievement by using sign language on the experimental group.

Chapter II, Methodology, indicates the basic structure of the design. This chapter describes the specific aim of the study,

statement of the research hypothesis, description of subjects, instruments, quasi-experimental design, procedure, statistical hypothesis, and limitations.

Chapter III, statistical analysis of the achievement test, explains how the control group and experimental group data was analyzed.

Chapter IV, statistical analysis of questionnaire response, explains how the questionnaire, given to the experimental group at the end of the study, was analyzed to compare subgroups of students as well as all students combined. The questionnaire asked for student responses regarding their perception of the effectiveness of sign language lessons on achievement in biology and personal relationships.

Chapter V contains a summary of the study, conclusions, implications, recommendations to improve the study, and suggestions for further study.

The appendices contain empirical data and analyses, aids to learning sign language, and other materials regarding factors in the study.

The brief bibliography is composed of selective literature regarding motivational topics related to this study.

CHAPTER II

METHODOLOGY

Specific Aim of the Study

The specific aim of this study was to answer the following question: What effect does sign language instruction, by a deaf student teacher, have on the achievement scores of ninth grade biology classes in a multicultural environment?

Statement of the Research Hypothesis

Since Gallaudet University requires its deaf undergraduate student teachers to successfully complete eight weeks of student teaching with normal hearing students, effective strategies aimed at improving student achievement need to be developed.

Biology may mean very little to some students. It may be the stimulation from rewarding activities that are important. Therefore, sign language lessons served as the rewarding activity in this investigation. This activity was designed to be rewarding to students interested in biology as well as those showing little or no interest. The student may receive sign language lessons at the same time subject matter is being taught. This use of sign language lessons to get students involved with the subject matter would be simple to implement, inexpensive to operate, and may increase achievement scores significantly. Therefore, it was hypothesized:

1. Experimental group students will show significant increases in achievement over control group students in ninth grade biology.

Description of Subjects

Sample groups for this study were chosen from one specific junior high school. The average membership at this school was approximately nine hundred students. One other junior high school also served as a feeder school to the senior high school in this school district. The two junior high schools are approximately the same size. The senior high school has approximately two thousand two hundred tenth, eleventh, and twelvth grade students. This city school district had a total student membership of about nine thousand students and was multicultural. There were five regular biology classes in this school. The same teacher taught the five classes.

To be enrolled in biology a student was recommended by his/her eighth grade physical science teacher, generally. Students should be average or above in the fundamentals of reading and mathematics. Some students were above average. Many students were below average since almost any student could have been admitted if admittance was demanded. Thus, students in classes ranged from very high aptitude to very low aptitude. The two existing groups chosen for this study were largely average to above average and were taught during the second and third periods in the day. The second period class interval was 9:48 A. M. to 10:42 AM. The third period class interval was 11:19 A. M. to 12:13 A. M.

Instruments

Biology subjects were post tested. This achievement test was carefully designed by the cooperating teacher to cover subject matter taught by the student teacher from unit five in the textbook.

The achievement test consisted of forty five multiple choice questions. These questions covered materials taught between February 11, 1988 and March 4, 1988. This unit consisted of three chapters dealing with microorganisms. A copy of this test is found in Appendix C.

A covariate was used to equate differences on the post test. This covariate consisted of the average scores of the prior four tests. Prior refers to the time immediately before the student teacher began any interaction with experimental and control groups.

A questionnaire was given to students in the experimental group only. This questionnaire was used to value students perceptions regarding personal relationships and subject matter achievement. The questionnaire contained eleven questions. A copy of this questionnaire can be found in Appendix E.

Quasi-Experimental Design

Two ninth grade biology classes were taught by the deaf student teacher. The two groups were randomly, by the flip of a coin by the researcher, chosen as experimental and control groups. Students in the two groups, however, were not randomly selected. The control and experimental groups contained thirteen and eighteen students, respectively.

The researcher administered the appropriate post test to control and experimental groups. This test covered three weeks of specific subject matter taught by the student teacher. The treatment was applied to the experimental group students during this period of time. Post test results for the control and experimental groups were statistically compared. The Analysis of Covariance was the statistical method used. This method equated the post test results for

initial differences on the covariate. It determined if there was a significant difference between control and experimental groups at the .05 probability level.

Procedure

Subjects in the experimental groups were given sign language lessons centered around subject matter activities for the class period. This was done for three straight weeks. Sign language lessons were being offered as a student motivational device. The learning of subject matter was centered around these sign language lessons.

At the end of the study questionnaires were given to experimental group students for their responses regarding their perceptions of the effectiveness of the sign language lessons.

Control group subjects received the same instruction at school. They were not, however, given sign language lessons. They were not persuaded to interact with the subject matter through using sign language lessons as the motivator.

Statistical Hypothesis

The null hypothesis was used to test for difference in achievement between the experimental and control groups. They hypothesis was:

There will be no significant difference in the post test achievement test scores between the class receiving sign language lessons and the class that did not.

Limitations

Random sampling of subjects was not possible since the groups were already formed, so existing control and experimental groups may

have been significantly different. However, the covariate in the Analysis of Covariance statistic equated group differences.

Instructor effectiveness and efficiency regarding the implementation of meaningful sign language lessons, centered around subject matter, may not have properly motivated students.

The Hawthorne Effect may have caused the experimental class to accomplish more than the control class. This external factor was minimized because of the use of existing groups.

This chapter explained the basic structure of the design. It described the specific aim of the study, statement of the research hypothesis, description of subjects, instruments, quasi-experimental design, procedure, statistical hypothesis, and limitations.

CHAPTER III

STATISTICAL ANALYSIS OF QUESTIONNAIRE RESPONSES

The Questionnaire

The Correlation Grid on page 13 was designed for convenience in comparing responses on the experimental questionnaire. The questionnaires (Appendix E) were given to experimental group students at the end of the study. Questionnaires were given to students two times. The first time students responded to questionnaires they were told not to sign their names. Students did not know they would respond to the same questionnaires a second time until all questionnaires with no names were collected. Experimental students were then given duplicates of the original questionnaire for their responses. After responding this time, students were told to sign their names. This method was used to validate questionnaire responses. It also provided a way to develop variable categories which could be correlated to determine if significant relationships existed. The Pearson R (Product Moment Correlation) was used to determine correlations. The App-Stat Statistical Package developed by Statsoft was used to perform this function.

The variable categories are listed below:

1. All students with no signatures.
2. All students with signatures.
3. All black students with signatures.
4. Male black students with signatures.
5. Female black students with signatures

6. All white students with signatures.

7. Male white students with signatures.

8. Female white students with signatures.

Correlation output, regarding variable categories one to eight, are found in Appendix F. The Correlation Grid on page 13 can be used to easily determine variables that did or did not show a positive relationship. The Grid on page 13 indicates important positive relationships between all of the variables except:

1. 1 and 4 = All students (no names) vs. male blacks (names).

2. 2 and 4 = All students (names) vs. male blacks (names).

3. 3 and 8 = All blacks (names) vs. female whites (names).

4. 4 and 5 = Male blacks (names) vs. female blacks (names).

5. 4 and 6 = Male blacks (names) vs. all whites (names).

6. 4 and 7 = Male blacks (names) vs. male whites (names).

7. 4 and 8 = Male blacks (names) vs. female whites (names).

8. 5 and 8 = Female blacks (names) vs. female whites (names).

9. 7 and 8 = Male whites (names) vs. female whites (names).

Variables showing the most insignificant relationships are:

1. Male blacks (names) vs. female whites (names).

2. All students (no names) vs. male blacks (names).

Male blacks were involved in the top six most insignificant relationships of the nine unimportant correlations. They, generally, rated the value of sign language lessons much lower than the other seven student categories rated sign language lessons.

The most positive relationships of the variables shown on the Correlation Grid are:

1. All students (no names) vs. all whites (names).

CORRELATION GRID

Numerical Codes are given below the following grid. Vertical and horizontal numbers on the grid are matched to these codes. Used as coordinates, the numbers may determine if there are significant positive correlations between the identified variables. Since the .05 probability level was chosen for the Pearson r statistic a number smaller than .05 indicates a significant

	1	2	3	4	5	6	7	8
1	.0000	.0008	.0027	.3588	.0012	.0001	.0015	.0015
2	.0008	.0000	.0003	.1005	.0004	.0003	.0001	.0115
3	.0027	.0003	.0000	.0406	.0001	.0059	.0070	.0920
4	.3588	.1005	.0406	.0000	.1863	.3126	.1579	.5779
5	.0012	.0004	.0001	.1863	.0000	.0041	.0086	.0731
6	.0001	.0003	.0059	.3126	.0041	.0000	.0006	.0065
7	.0015	.0001	.0070	.1579	.0086	.0006	.0000	.0741
8	.0015	.0115	.0920	.5779	.0731	.0065	.0741	.0000

positive correlation.

1 - ALL STUDENTS (NO NAMES)
2 - ALL STUDENTS (NAMES)
3 - ALL BLACKS (NAMES)
4 - MALE BLACKS (NAMES)
5 - FEMALE BLACKS (NAMES)
6 - ALL WHITES (NAMES)
7 - MALE WHITES (NAMES)
8 - FEMALE WHITES (NAMES)

2. All students (names) vs. all whites (names).

Many other strong positive relationships can easily be determined by examining the Correlation Grid.

Since there was a high positive correlation ($p = .0008$) between all students (no names) and all students (names) this indicated responses on the questionnaires were valid.

Questionnaire items (Appendix E) were averaged, regarding the responses of the eighteen students in the experimental group. The averages were recorded on the questionnaires (Appendix E) and identified for all students (no names) and all students (names). This was the correlation used to validate the questionnaire. Averages for all blacks and all whites are also contained in Appendix E. Averages may also be found on the data file (Appendix F) for all of the correlated variables. This was the data file used to determine the Pearson r values found in Appendix F.

Response Summary

The validated questionnaire averages for all students with no names indicates:

1. Sign language lessons from the student teacher were valued most highly by students in creating a feeling of friendliness towards him. Students also highly valued sign language lessons, as being an enjoyable experience and were motivated to learn more sign language. The group felt that more time to learn sign language would have a moderately high positive effect on their achievement in biology and also in their communication with the student teacher.

2. The overall achievement in biology was valued between low and moderate. As mentioned above, students felt this was due to a

lack of time to learn sign language. Students, generally, felt that sign language lessons effected achievement in subject matter less positively than developing personal relationships with the student teacher.

Averages for the eight variable categories may be examined on the four separate questionnaires in Appendix E if examination of specific category variables is desired.

CHAPTER IV

STATISTICAL ANALYSIS OF THE ACHIEVEMENT TEST

Analysis of Covariance

The Analysis of Covariance was the statistic chosen to determine if a significant difference between control and experimental groups existed on the dependent variable following the treatment. The following table is a summary of this statistical design.

EFFECTS	VARIABLES ON DATA FILE	CODES	GROUPS
A	1 (Groups)	1	Experimental
		2	Control
B	7 (Sex)	3	Male
		4	Female
C	8 (Race)	5	Black
		6	White
Covariate	2	Pre-test average scores of prior four tests. Each test=45 questions. (multiple choice)	Individual scores
Dependent variable	3	Post-test # correct out of 45 questions	Individual scores
Dependent variable	4	Post-test achievement test scores (% average)	Individual scores
Sex	5 (same as 7)	1	Male
		2	Female
Race	6 (same as 8)	1	Black
		2	White

The Covariate

The covariate, used to equate differences on the dependent variable, consisted of the average scores of the prior four chapter tests. Prior refers to the time immediately before the student teacher began any interaction with experimental and control groups before January 12, 1988. Each of the tests contained forty five multiple choice and matching type questions which were answered on scan tron sheets.

The Achievement Test

The achievement test consisted of forty five multiple choice questions. The test covered unit five which was the unit taught by the student teacher between February 11, 1988 and March 4, 1988. This unit consisted of three chapters. The cooperating teacher developed forty five multiple choice questions which accurately represented the subject matter in unit five. This forty five question achievement test was given on Monday, March 7, 1988 immediately following the last day of the student teacher's participation. The achievement test was unannounced so studying for the test could not be a variable. A copy of this test is found in Appendix C.

Findings from the Analysis of Covariance

The data file with codes can be found in Appendix D. This was the data gathered from the study. A summary of the Analysis of Covariance findings may be found in Appendix D. This summary shows initial differences between control and experimental groups, as indicated by the statistical significance of the covariate. The Analysis of Covariance statistic adjusts the achievement test means. The three effects (A = Groups, B = Sex, C = Race), which had

Adjusted means showed a significant two-way interaction between B and C. There was no significant difference on the adjusted means between the experimental and control groups of Effect A. Refer to page sixteen which shows a summary of the statistical design.

Since there was a significant interaction between Effects B and C (Sex and Race) at the .0461 level as shown on the summary of design (Appendix D), this interaction was further investigated. Separate Analyses of Covariance between Sex and Race were performed which showed the adjusted means to be:

1. Male-Black = 32.9051595
2. Male-White = 41.2889053
3. Female-Black = 44.1612166
4. Female-White = 36.3956526

A summary of these analyses may be found in Appendix D. Trend lines for these interactions can be seen on the following four pages.

Post Hoc Analyses of Sex and Race Interaction

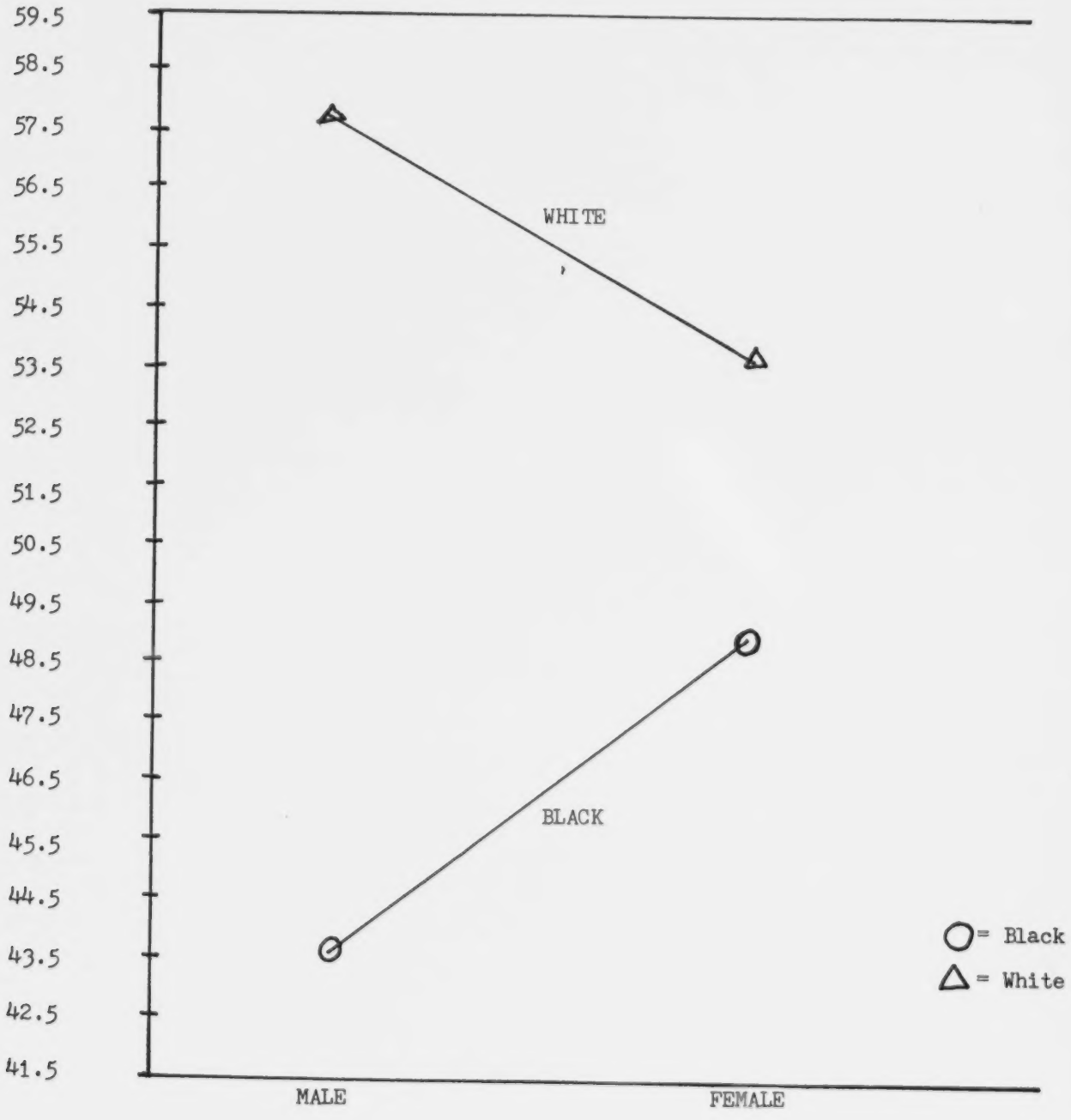
Effects B and C (Sex and Race) were further broken down and investigated by performing six separate one-way ANACOVAS' (Appendix D). The following combinations in each cell were the levels compared.

	B (3)	B (4)
C (5)	7 Male Black A	8 Female Black B
C (6)	9 Male White C	10 Female White D

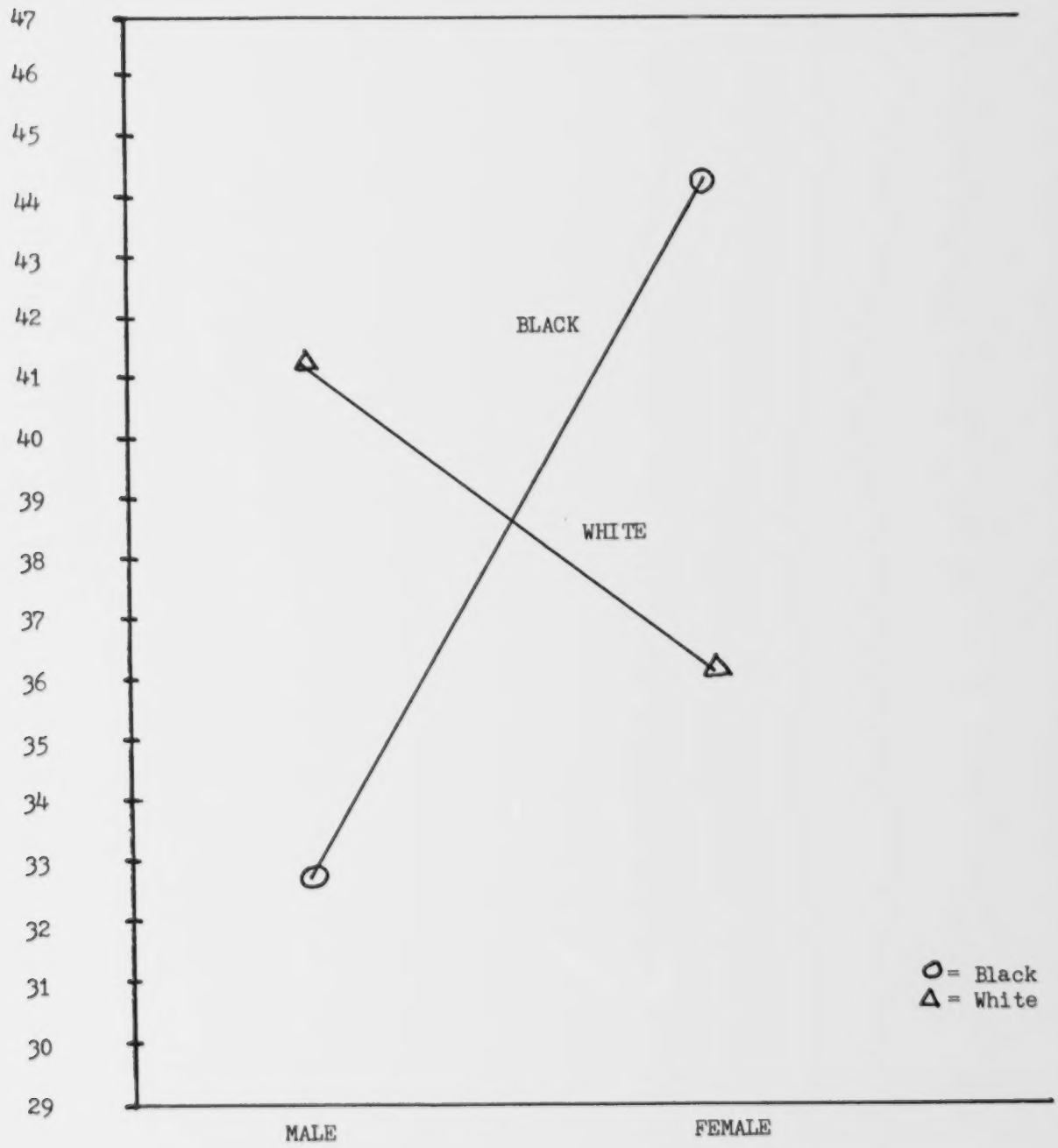
The six separate analyses were:

1. Male Black vs. Female Black.

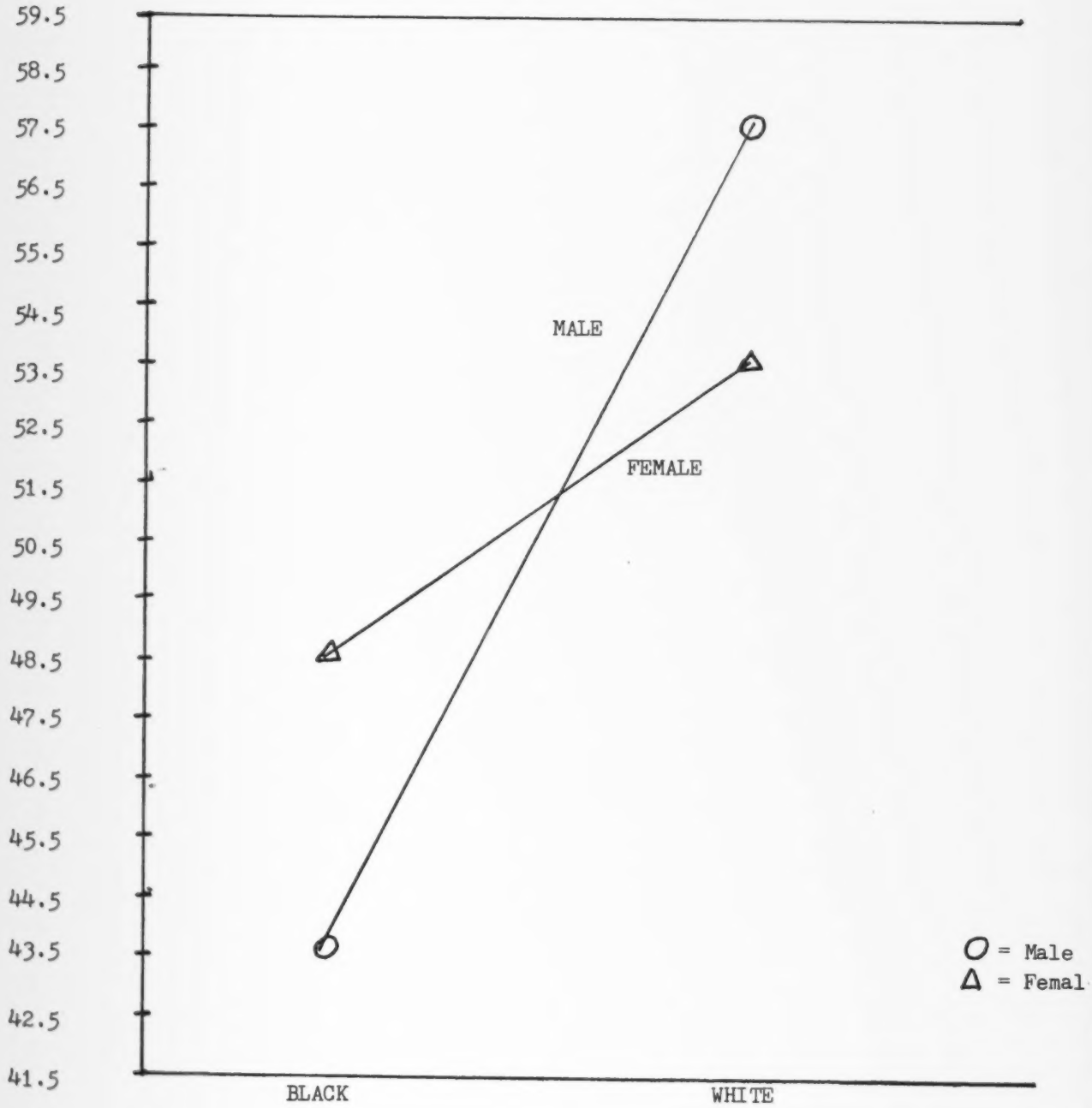
TREND LINES FOR ACHIEVEMENT ON THE COVARIATE



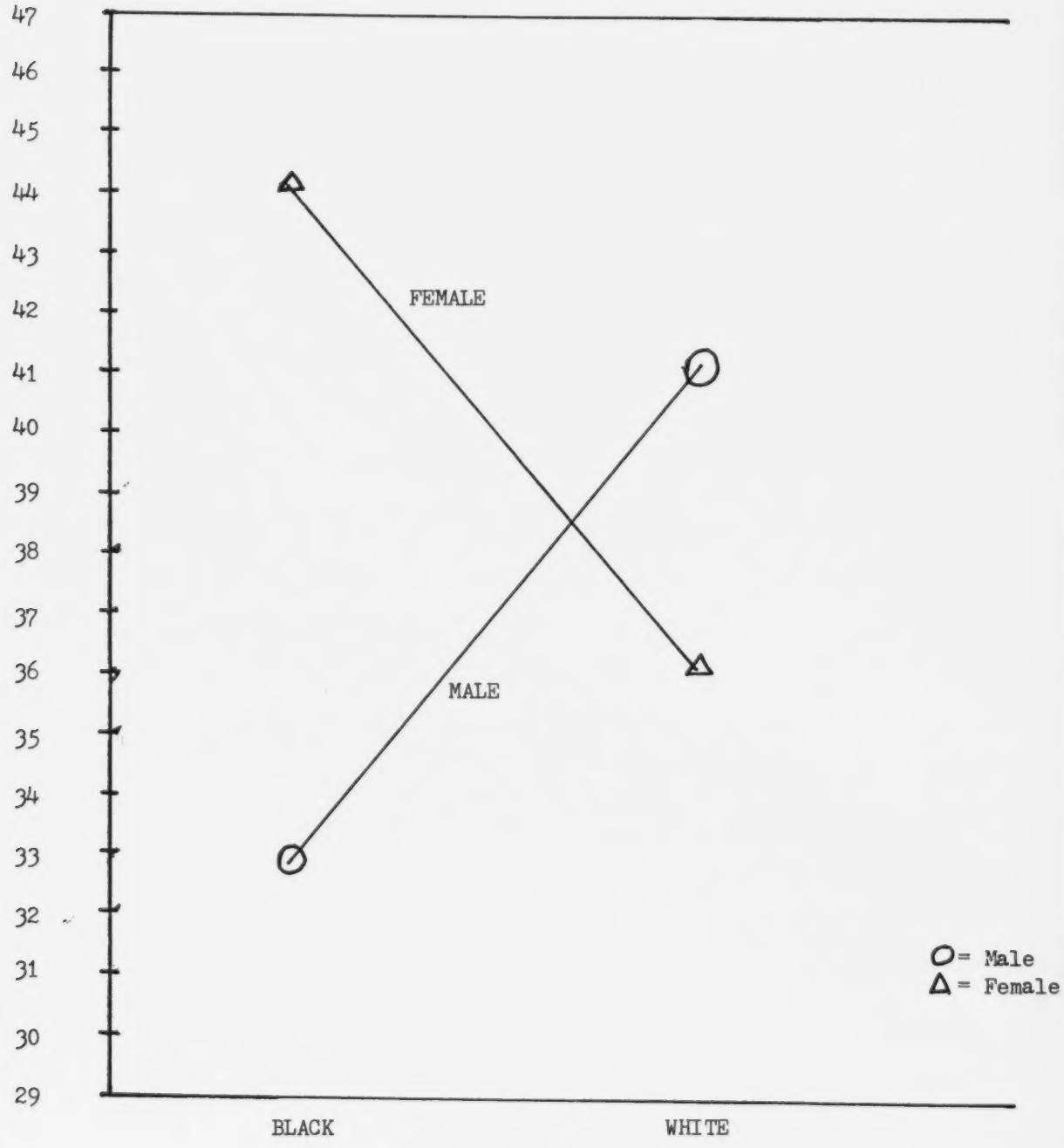
TREND LINES FOR ACHIEVEMENT ON THE DEPENDENT VARIABLE ADJUSTED FOR THE COVARIATE



TREND LINES FOR ACHIEVEMENT ON THE COVARIATE



TREND LINES FOR ACHIEVEMENT ON THE DEPENDENT VARIABLE ADJUSTED FOR THE COVARIATE



2. Male Black vs. Male White.

3. Male Black vs. Female White.

4. Female Black vs. Male White.

5. Female Black vs. Female White.

6. Male White vs. Female White.

The six analyses indicated a significant interaction between:

1. Male Black vs. Female Black (p=.0135).

2. Female Black vs. Female White (p=.0482).

The total size of the sample was thirty one. See the following table.

	Male	Female
Black	7	7
White	9	8

Summary of ANACOVA FINDINGS

The three way Analysis of Covariance indicated no significant difference between control and experimental groups due to the sign language lessons.

A significant interaction between sex and race (Effects B and C) was found. This significant finding showed that male blacks had the lowest achievement. Female blacks had the highest achievement. Male whites achieved less than female blacks but more than female whites. These differences in Effects were not due to the independent variable (sign language lessons) given to the experimental group since the three way interaction (A X B X C) was insignificant (p = .5714).

The covariate indicated male whites had the highest mean scores

(57.7288889). Female whites were next (53.8525). Female blacks followed female whites (48.72). Male blacks finished last (43.5371429).

Six separate one-way ANACOVAS' were performed between sex and race. Of the six different possible comparisons the analyses showed significant interactions between the following:

1. Male blacks vs. female blacks ($p = .0135$).
2. Female blacks vs. female whites ($p = .0482$).

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS TO IMPROVE STUDY, AND SUGGESTIONS FOR FURTHER STUDY

Summary

This quasi-experimental study was designed to investigate the effects of sign language lessons taught by a deaf black student teacher, on the achievement and perception of ninth grade biology classes.

The study was conducted during the period between January 12 and March 4 of 1988 at a junior high school in the Alexandria City, Virginia School District. This School District had a total enrollment of approximately nine thousand five hundred students. The size of the junior high school was approximately nine hundred students. The school system was multi-cultural with about forty per-cent black, forty per-cent white, and twenty per-cent various other ethnic groups. The school system had two junior high schools housing seventh, eighth, and ninth graders. The high school educated tenth, eleventh, and twelfth grade students.

The sample at the junior high school was two classes of ninth grade biology. The two classes were randomly selected as control and experimental groups. One black deaf student teacher taught both control and experimental biology classes. The deaf student teacher was from Gallaudet University in Washington D.C. An interpreter was used by the student teacher in communicating with students and associates.

The treatment given to the experimental group was sign language lessons. These lessons were given immediately prior to or following

the subject matter being taught. The control group was not given sign language lessons.

The researcher administered the appropriate achievement test, of forty five questions, to both control and experimental groups at the end of the eight week study. A covariate was used by the researcher to equate post-test differences between control and experimental groups. This covariate was the average of the four major tests, given immediately prior to the presence of the student teacher. Each of the four major tests was forty five questions and each test covered one chapter. The average of the four tests was used to determine the covariate score for each student in both control and experimental groups.

The statistical analysis design was a Three Way Analysis of Covariance. The covariate scores in this design equated post-test scores for initial differences on this pre-test. The .05 probability level was used to determine significant interaction. The three factors investigated were groups (control and experimental), sex (male and female), race (black and white). There were two levels for each factor. The design indicated no significant difference between control and experimental groups at the .05 level. The Null Hypothesis was, thus, not rejected. The analysis did indicate a significant interaction between sex and race. A post-hoc analysis of this interaction, using six separate ANACOVAS', indicated female blacks achieved more than male blacks ($p = .0135$) and female blacks achieved more than female whites ($p = .0482$).

Female blacks finished below both male whites and female whites on the covariate. However, female blacks finished above both male

whites and female whites on the post-test (achievement test). Black males finished lowest on both the covariate and the achievement test.

The student teacher, thus, had the greatest positive effect on black females regarding subject matter achievement.

A questionnaire was given to experimental group participants during the end of the study. The Product Moment Correlation (Pearson r) was used to examine questionnaire responses. Of the nine insignificant relationships, male blacks were involved in the top six. The most insignificant relationships, of these six, were male blacks vs. female whites and male blacks vs. all students. The most positive relationship was between all students vs. all whites. The questionnaire showed that students perceptions of sign language lessons effected achievement in subject matter less positively than in developing personal relationships with the student teacher.

The following generalizations refer to the students enrolled in biology in the secondary schools of the Alexandria, Virginia School System. It is possible to conceive of the results of this experiment as applicable to the population of secondary school students taking biology in the ninth grade in similar school districts.

Conclusions

The following conclusions were made from the analysis of data collected from the ninth grade biology classes achievements and perceptions during this quasi-experimental study:

1. There was no significant difference in achievement between control and experimental groups on the achievement test for the investigation in this study.

2. There was a significant difference in achievement between black females vs. black males and black females vs. white females on the achievement test for the investigation in this study.

The experimental group questionnaire indicated important differences (insignificant relationships) between male blacks vs. female whites and male blacks vs. all students. Male blacks were involved in the top six most insignificant relationships of the nine most unimportant correlations. The most positive relationship existed between all students vs. all whites.

Summaries of experimental group relationships are given on the correlation grid (Page 13) and Appendices E and F.

Questionnaire average results for all students indicated:

1. Sign language lessons were valued highly by students in creating a feeling of friendliness towards the student teacher.

2. Sign language lessons were valued highly by students in creating an enjoyable experience and in motivating participants to learn more sign language.

3. Students, generally, felt sign language lessons effected achievement in subject matter less positively than developing personal relationships with the student teacher. The questionnaire indicated this was largely due to a lack of time, regarding sign language lessons.

The researcher was able to implement the effect of sign language lessons in the process of teaching ninth grade biology classes without incurring additional expenses or requiring special facilities.

Implications

In comparing the control group to the experimental group, no significant difference in achievement was found. This indicated factors other than giving students the opportunity to receive sign language lessons, in ninth grade biology from a deaf student teacher, as being responsible for the performance of the students in the junior high schools in the Alexandria, Virginia School District.

Black females in both control and experimental groups combined showed significant increases in achievement over black males and white females. This indicated that the black male student teacher and/or the use of sign language produced significant increases in achievement for this group of participants. Since the covariate showed white males and females achieving more than both black males and black females and since the cooperating teacher was a white male the male aspect can be cancelled. This indicated that significant increases in achievement shown by black females were due to either the race (Black) of the student teacher and/or the sign language method of teaching used by the deaf student teacher. This indicates a need for more research in this area.

Black males had significantly different perceptions of the deaf black student teacher, regarding the effectiveness of the sign language lessons. They rated the effectiveness lower on practically all of the eleven questions on the questionnaire when compared to the other categories, as well as all experimental students combined. Thus, coupled with the fact that achievement on both the covariate and achievement test was lower than for other categories of students, the sex (male) may have an effect on black student achievement,

since both the cooperating teacher and the student teacher were of the same sex (male). Since poor black male performance was present for both the black male student teacher and the white male student teacher race may not be as strong a factor as sex, regarding black male performance in biology. Male black students may not relate as well with male biology teachers as other categories of students relate with male biology teachers. Of course, the deafness factor, may have been responsible for poor performance by black males taught by the deaf black male student teacher. This indicated a need for more formal studies in this area.

Average responses for all students on the questionnaire showed students valued sign language lessons highly when related to developing personal relationships. Due to a lack of time, students felt sign language did not add to their biology achievement. This indicated that deaf student teachers should give sign language lessons to normal hearing students, since it helps develop positive personal relationships. Over a longer period of time, sign language lessons may also improve student achievement significantly.

Overall, experimental group perceptions agreed with achievement indicating students had a good understanding of the cause-effect relationship.

Recommendations to Improve the Study

1. Sign language lessons should be given at beginning of class and lessons should contain signs that will be used during the subject matter presentation.

2. Sign language lessons should be carefully planned, since students enjoy it. If carefully implemented it could serve as a

powerful motivator toward teaching subject matter.

3. A professional looking majic slate should be developed for the deaf student teacher. This would aid in iteracting with students, cooperating teacher, and other associates in the educational environment. It would be especially helpful in dealing with fine details such as are often encountered in biology.

Suggestions for Further Study

1. A similar study could be conducted using random sampling of subjects into control and experimental groups. This would make the study more internally valid.

2. A similar study could be conducted using a deaf female student teacher to determine if the sex produces different effects on male black students. Creative thinking could lead to a great variety of different studies related to the above suggestion.

3. A similar study could be conducted extending the length of time in using the sign language lessons, since a lack of time may have been the reason a significant increase was not found between experimental and control groups in this study.

4. A similar study could be conducted using other grade levels, since effectiveness of sign language may depend on the maturity level of students.

5. A similar study could be conducted using other courses, since effectiveness of sign language may depend on the educational environment, regarding subject matter.

6. Similar studies could be conducted comparing classes taught by deaf teachers or student teachers to normal hearing teachers or student teachers, to determine what causes improvement in achievement.

APPENDIX A

TEXTBOOK USED IN THE STUDY

THE CLASSES TAUGHT BY THE DEAF STUDENT TEACHER USED THE FOLLOWING TEXTBOOK:

Oram, Raymond F.; Hummer, Paul J.; Smoot, Robert C. Biology, Living Systems. Columbus, Ohio: Charles E. Merrill Publishing Company, 1983.

APPENDIX B

HAND SIGN LANGUAGE AIDS INCLUDING SAMPLES

A BASIC COURSE IN AMERICAN SIGN LANGUAGE

TOM HUMPHRIES
CAROL PADDEN
TERRENCE J. O'ROURKE

ILLUSTRATED BY FRANK A. PAUL

GALLAUDET COLLEGE LIBRARY
WASHINGTON, D. C.

T·J·PUBLISHERS

HAVE, own, possess

HOME

IN, contained in

KNOW, aware, conscious

LIKE

LOSE

MONEY, financial, economic

NAME

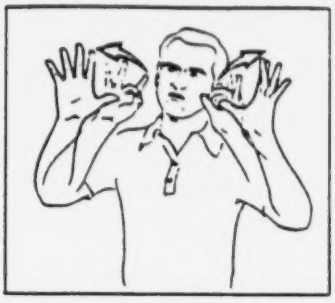
NEED, necessary

NEW, modern

OLD, age

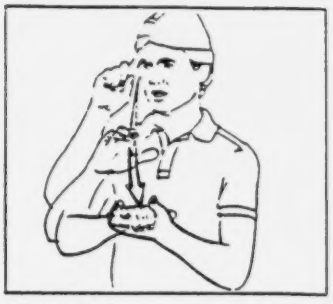
ORANGE

Vocabulary



AWFUL, terrible

BAD, unfortunate



BELIEVE

CAT

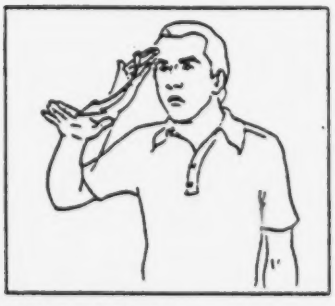
CHEAP

CLEAN, NICE, pure

COLD, WINTER

DIRTY

DOG



DON'T-KNOW

DON'T-LIKE

DON'T-WANT

Go ahead...

Introduce Yourself!

(Find out how on the other side.)

For more information contact:

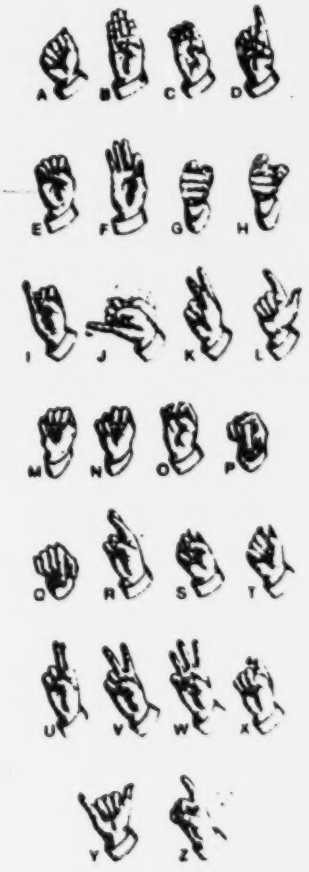
The National Information Center on Deafness
Gallaudet College
800 Florida Avenue, NE
Washington, D.C. 20002

© Gallaudet College

Signs from *The Joy of Signing* are printed with permission from the Gospel Publishing House

My Name Is...

(Pick out the letters that spell your name!)



TIPS

to help you communicate with a person who is hard of hearing...

DO face the person when you are speaking

DON'T chew gum, smoke, bite a pencil, or cover your mouth while talking — it makes speech difficult to understand!

DO rephrase sentences or substitute words rather than repeat yourself again and again.

DON'T shout! Speak clearly and at a normal voice level.

DO be patient!

TIPS

to help you communica with a person who is hard of hearing...

DO move away fron noisy areas or t source of noise loud air conditioning, loud music, TV and radio.

DON'T stand with brig light (window, s behind you — glare makes it difficult to see your face.

DO get the hearing-impaired person attention and ta in full view *befo* talking.

DO contact for mo information:

The National Informatio Center on Deafness
Gallaudet College
800 Florida Avenue, NE
Washington, D.C. 20002

© Gallaudet College

APPENDIX C

ACHIEVEMENT TEST SAMPLE

BIOLOGY ACHIEVEMENT TEST

UNIT V (CPTS. 17, 18, AND 19)

USE SCAN TRONS FOR ALL ANSWERS

DO NOT WRITE ON THIS SHEET

OBJ# 1

1 WHICH OF THE FOLLOWING PERTAINS TO A PROVIRUS?

1 A. FORMED DURING THE LYSOGENIC CYCLE
B. UNCOATED BEFORE BEING REPRODUCED
C. THE VIRUS THAT ATTACKS A HOST
D. BOTH A AND B
E. NONE OF THE ABOVE ARE CORRECT
OK

OBJ# 2

2 OF THE FOLLOWING WHICH IS NOT AN EXAMPLE OF GENETIC RECOMBINATION IN BACTERIA?

2 A. SPORE FORMATION
B. TRANSFORMATION
C. CONJUGATION
D. TRANSDUCTION
E. BOTH A AND D
OK

OBJ# 3

3 WHICH APPLIES TO ASEXUAL REPRODUCTION?

3 A. OFFSPRING ALWAYS PROD.BY MITOSIS
B. OFFSPRING ALWAYS HAVE VARIETY
C. OFFSPRING HAVE THE SAME GENOTYPES
D. OFFSPRING ARE PRODUCED BY FUSION
E. BOTH A AND B
OK

OBJ# 4

4 FRAGMENTATION MAY OCCUR IN WHICH OF THE FOLLOWING?

4 A. BACTERIA
B. VIRUSES
C. YEASTS
D. BLUE-GREEN ALGAE
E. BOTH D AND A
OK

TURN TO OTHER SIDE

OBJ# 5

5 WHICH OF THE FOLLOWING HAPPENS DURING THE LYTIC CYCLE?

5 A. VIRAL DNA ATTACHES TO BACT.DNA
B. NEW VIRAL DNA IS PRODUCED
C. THE VIRUS IS DESTROYED
D. HOST CELL DNA TAKES OVER THE VIRU
E. NONE OF THE ABOVE
OK

OBJ# 6

6 WHICH OF THE FOLLOWING PRODUCE CONIDIA?

6 A. ALL FUNGI
B. SOME MOLDS
C. MUSHROOMS
D. NOSTOC
E. BOTH B AND C
OK

OBJ# 7

7 RNA TUMOR VIRUSES

7 A. DO NOT KILL HOST CELLS
B. ARE KNOWN TO CAUSE ANIMAL TUMORS
C. ARE COPIED BY REVERSE TRANSCRIP.
D. ALL OF THESE
E. NONE OF THE ABOVE
OK

OBJ# 8

8 FORMATION OF CHAINS OF YEAST CELLS IS AN EXAMPLE OF:

8 A. CONJUGATION
B. FRAGMENTATION
C. FISSION
D. BUDDING
E. BOTH C AND D
OK

OBJ# 9
9 WHICH OF THE FOLLOWING ORGANISMS WOULD NOT REPRODUCE BY FISSION?

9 A. EUGLENA
B. BREAD MULD
C. AMOEBA
D. BACTERIUM
E. BOTH B AND D
OK

OBJ# 10
10 WHICH OF THE FOLLOWING MAY REPRODUCE BY SPORES?

10 A. BREAD MOLD
B. PENICILLIUM
C. BACTERIA
D. BOTH A AND B
E. BOTH B AND C
OK

OBJ# 11
11 BACTERIOPHAGES DO WHICH OF THE FOLLOWING?

11 A. CONTAIN RNA
B. NEED A VIRUS FOR REPRODUCTION
C. MAY CAUSE DEATH OF A HOSTA CELL
D. BOTH A AND C
E. BOTH B AND C
OK

OBJ# 12
12 HOW DOES BREAD MOLD REPRODUCE?

12 A. ASEXUALLY ONLY
B. SEXUALLY ONLY
C. BOTH A AND B
D. BY HETEROCYSTS
E. BOTH B AND D
OK

OBJ# 13
13 WHAT DOES SEXUAL REPRODUCTION INVOLVE?

13 A. MITOSIS
B. IS ADAPTIVE, IN CHANGING ENVIR.
C. IS A FISSION PROCESS
D. ALWAYS INVOLVES GAMETES
E. ALL OF THE ABOVE
OK

OBJ# 14
14 WHICH OF THE FOLLOWING REFERS TO ASEXUAL REPRODUCTION OCCURRING ONLY IN UNICELLULAR ORGANISMS

14 A. BUDDING
B. CONJUGATION
C. FISSION
D. FRAGMENTATION
E. TRANSDUCTION
OK

OBJ# 15
15 WHICH OF THE FOLLOWING IS AN OUTGROWTH THAT FORMS ON THE PARENT ORGANISM?

15 A. BUDDING
B. CONJUGATION
C. FISSION
D. FRAGMENTATION
E. TRANSFORMATION
OK

CONTINUED ON NEXT PAGE

OBJ# 16
16 WHAT MUST HAPPEN TO GASES BEFORE THEY CAN BE EXCHANGED?

16 A. THEY MUST BE INTRACELLULAR
B. THEY MUST BE DIGESTED
C. THEY MUST BE CONSIDERED NUTRIENTS
D. THEY MUST BE DISSOLVED
E. THEY MUST BE MADE INTO A LIQUID
OK

OBJ# 17
17 WHICH OF THE FOLLOWING IS NOT A MEANS OF FOOD-GETTING AMONG FUNGI?

17 A. TRAPPING OF NEMATODES
B. SAPROPHYTISM
C. PARASITISM
D. PHOTOSYNTHESIS
E. BOTH B AND D
OK

OBJ# 18
18 IN WHICH OF THE FOLLOWING DOES INTRACELLULAR DIGESTION OCCUR?

18 A. EUGLENOIDS
B. RHIZOPUS
C. AMOEBA
D. BOTH A AND C
E. A, B, AND C ARE ALL CORRECT
OK

OBJ# 19
19 DIGESTION:

19 A. CONVERTS TO SMALLER MOLECULES
B. OF EVERY NUTRIENT IS NECESSARY
C. OCCURS ONLY IN HETEROTROPHS
D. BOTH A AND B ARE CORRECT
E. BOTH A AND C ARE CORRECT
OK

OBJ# 20
20 WHICH OF THE FOLLOWING IS NOT A NUTRIENT OF HETEROTROPHS?

20 A. GLUCOSE
B. MINERAL IONS
C. CARBON DIOXIDE
D. VITAMINS
E. BOTH B AND C
OK

OBJ# 21
21 WHICH OF THE FOLLOWING REFERS TO A RESPONSE OF CYTOPLASM TO A STIMULUS?

21 A. AMOEBOID
B. BASIC IRRITABILITY
C. CILIARY MOTION
D. EGESTION
E. ESSENTIAL NUTRIENT
OK

OBJ# 22
22 CHANGES BETWEEN SOL AND GEL REFERS TO:

22 A. AMOEBOID MOTION
B. BASIC IRRITABILITY
C. CILIARY MOTION
D. EGESTION
E. ESSENTIAL NUTRIENT
OK

OBJ# 23
23 WHICH OF THE FOLLOWING INVOLVES MICROTUBULES?

23 A. AMOEBOID MOTION
B. BASIC IRRITABILITY
C. CILIARY MOTION
D. EGESTION
E. ESSENTIAL NUTRIENT
OK

TURN TO OTHER SIDE

OBJ# 24
24 WHICH OF THE FOLLOWING REFERS TO THE ELIMINATION OF UNDIGESTIBLE MATERIALS?

24 A. AMOEBOID MOTION
B. BASIC IRRITABILITY
C. CILIARY MOTION
D. EGESTION
E. ESSENTIAL NUTRIENT

OBJ# 25
25 WHICH OF THE FOLLOWING MUST BE OBTAINED FROM THE ENVIRONMENT?

25 A. NITROGENOUS WASTE
B. EXCRETION
C. ESSENTIAL NUTRIENT
D. BASIC IRRITABILITY
E. LIQUID WASTE
OK

OBJ# 26
26 WHICH ORGANISMS HAVE EXTRACELLULAR DIGESTION?

26 A. BREADMOLD AND EUGLENA
B. BREADMOLD AND PARAMECIUM
C. AMOEBA AND PARAMECIUM
D. AMOEBA, PARAMECIUM, & EUGLENA
E. BREADMOLD AND MUSHROOM
OK

OBJ# 27
27 WHICH ORGANISM TRAPS FOOD BY PHAGOCYTOSIS?

27 A. BREADMOLD
B. AMOEBA
C. PARAMECIUM
D. MUSHROOM
E. BOTH B AND C
OK

CONTINUED ON NEXT PAGE

OBJ# 28
28 WHICH ORGANISM(S) IS(ARE)SAPROPHYTIC?

28 A. BREADMOLD
B. AMOEBA
C. PARAMECIUM
D. BREADMOLD AND MUSHROOM
E. EUGLENA
OK

OBJ# 29
29 IN WHICH ORGANISM DOES UNDIGESTED FOOD LEAVE BY EXOCYTOSIS?

29 A. BREADMOLD
B. AMOEBA
C. EUGLENA
D. PARAMECIUM
E. MUSHROOM
OK

OBJ# 30
30 WHICH ORGANISM, WHEN IT COMES INTO CONTACT WITH AN OBJECT, BACKS AWAY AND TURNS AT A DEFINITE ANGLE?

30 A. AMOEBA
B. EUGLENA
C. PARAMECIUM
D. BOTH A AND B
E. BOTH B AND C
OK

OBJ# 31
31 RECOVERY FROM A DISEASE CAUSED BY A VIRUS INVOLVES:

31 A. ANTIBIOTICS
B. INTERFERON
C. ANTISERA
D. MEMORY CELLS
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 32
32 A DISEASE CAUSED BY A VIRUS IS:

32 A. TETANUS
B. ANTHRAX
C. TUBERCULOSIS
D. POLIO
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 33
33 INFECTIOUS DISEASES:

33 A. ARE CAUSED BY PATHOGENS
B. ARE INHERITED
C. ARE CAUSED BY MUTATION
D. CANNOT BE SPREAD
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 34
34 WHICH OF THE FOLLOWING IS NOT PART OF THE IMMUNE SYSTEM?

34 A. LYMPH NODES
B. SPLEEN
C. THYMUS
D. LIVER
E. MORE THAN ONE OF THE ABOVE
OK

TURN TO OTHER SIDE

OBJ# 35
35 WHICH OF THE FOLLOWING IS NOT AN INFECTIOUS DISEASE?

35 A. INFLUENZA
B. PNEUMONIA
C. STREP THROAT
D. BOTULISM
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 36
36 PURE SUBSTANCES PRODUCED FROM HYBRIDOMAS ARE:

36 A. VIROIDS
B. ANTISERA
C. SYNTHETIC VACCINES
D. MONOCLONAL ANTIBODIES
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 37
37 IN THE IMMUNE RESPONSE,

37 A. ANTIBODIES COMBINE WITH ANTIGENS
B. ANTIGENS COMBINE WITH PLASMA CELLS
C. LYMPHOC.COMBINE WITH MACROPHAGES
D. ANTIBODIES COMBINE WITH COMPLEMENT
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 38
38 A VACCINATION RESULTS IN:

38 A. PRODUCTION OF ANTIBODIES
B. PASSIVE IMMUNITY
C. ACTIVE IMMUNITY
D. BOTH A AND C
E. BOTH A AND B
OK

OBJ# 39
39 PASTEURIZATION

39 A. DOES NOT KILL MOST BACTERIA
B. RETARDS GROWTH OF BACTERIA
C. INV.COOLING FOLLOWED BY HEATING
D. REQ.FAST-FREEZING METHODS
E. MORE THAN ONE OF THE ABOVE
OK

OBJ# 40
40 AN EXAMPLE OF A FUNGAL DISEASE IS:

40 A. PNEUMONIA
B. RINGWORM
C. WHOOPING COUGH
D. BOTH A AND B
E. BOTH A AND C
OK

OBJ# 41
41 AN EFFECTIVE PREVENTATIVE MEASURE FOR A DISEASE SUCH AS TETANUS IS THE USE OF:

41 A. INTERFERON
B. AN ANTISERUM
C. A VACCINE
D. BOTH B AND C
E. BOTH A AND B
OK

OBJ# 42
42 SYMPTOMS OF MALARIA OCCUR WHEN

42 A. RED BLOOD CELLS BURST
B. THE PATHOGEN IS IN THE LIVER
C. THE MOSQUITO BITE OCCURS
D. NONE OF THESE
E. ALL OF THESE
OK

OBJ# 43
43 ACCORDING TO KOCH'S POSTULATES, AN ORGANISM SUSPECTED OF CAUSING A DISEASE MUST:

43 A. BE PRESENT IN DISEASED HOST
B. BE ISOL.AND GROWN IN CULTURE
C. CAUSE DISEASE IN HEALTHY HOST
D. ALL OF THE ABOVE
E. NONE OF THE ABOVE
OK

OBJ#44
44 POISONS RELEASED IN A HOST BY LIVING BACTERIA:

44 A. ARE EXOTOXINS
B. TRAVEL THROUGH THE BLOOD
C. ARE ENDOTOXINS
D. BOTH A AND B
E. BOTH A AND C
OK

OBJ# 45
45 FUNGI ARE WHAT KIND OF PATHOGENS?

45 A. ONLY PLANT
B. ONLY ANIMAL
C. PARASITIC
D. SAPROPHYTIC
E. MORE THAN ONE OF THE ABOVE
OK

PLACE THIS SHEET AND SCAN TRON SHEET IN TRAYS AT FRONT OF CLASS

APPENDIX D

ACHIEVEMENT TEST DATA ON SUBJECTS

ANALYSIS OF VARIANCE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL GROUPS
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR1 CODES:1 2
Independent variable (B): VAR7 CODES:3 4
Independent variable (C): VAR8 CODES:5 6

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	1061.31046	1	1061.31046	13.6919777	.0015
A	2.6224608	1	2.6224608	.0338323953	.8333
B	59.4600492	1	59.4600492	.767094742	.3946
C	8.04672378	1	8.04672378	.103810871	.7454
A x B	5.19547356	1	5.19547356	.0670268609	.7863
A x C	19.5220163	1	19.5220163	.251853745	.6259
B x C	337.99076	1	337.99076	4.36042248	.0461
A x B x C	26.4480007	1	26.4480007	.341205945	.5714
WITHIN	1705.29273	22	77.5133057		

ANALYSIS OF VARIANCE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL GROUPS
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (B): VAR7 CODES:3 4
Independent variable (C): VAR8 CODES:5 6

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	1730.99709	1	1730.99709	25.36245	.0001
B	77.5338488	1	77.5338488	1.1360206	.2966
C	.641608904	1	.641608904	9.40080939E-03	.8857
B x C	484.72138	1	484.72138	7.10210422	.0125
WITHIN	1774.51013	26	68.2503897		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (7)	* VAR (8)	MEAN	STDV	
3	* 5	28.2542857	9.99584891	7
	* 6	44.9377778	14.4361184	9
4	* 5	42.5414286	7.74530685	7
	* 6	37.7775	11.2049373	8

Mean for entire sample:38.7816129 Standard Deviation:12.5557215 N:31

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (7)	* VAR (8)	MEAN	STDV	
3	* 5	43.5371429	7.14069013	7
	* 6	57.7288889	17.4588434	9
4	* 5	48.72	13.1412455	7
	* 6	53.8525	13.5248087	8

Mean for entire sample:51.4896774 Standard Deviation:14.0859674 N:31

Adjusted Means (adjusted for Covariate):

CODES VAR (7)	* VAR (8)	ADJUSTED MEAN
3	* 5	32.9051595
	* 6	41.2889053
4	* 5	44.1612166
	* 6	36.3956526

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL

```
Subject: 1   1 52.33 16 35.56 2 1 4 5 8
Subject: 2   1 81.98 32 71.11 1 2 3 6 9
Subject: 3   1 34.88 12 26.67 1 1 3 5 7
Subject: 4   1 45.35 17 37.78 1 2 3 6 9
Subject: 5   1 69.77 24 53.33 2 2 4 6 10
Subject: 6   1 65.12 23 51.11 2 2 4 6 10
Subject: 7   1 45.93 15 33.33 2 1 4 5 8
Subject: 8   1 31.4 14 31.11 2 2 4 6 10
Subject: 9   1 42.44 9 20 2 2 4 6 10
Subject: 10   1 42.44 8 17.78 1 1 3 5 7
Subject: 11   1 47.67 21 46.67 2 1 4 5 8
Subject: 12   1 44.19 21 46.67 2 1 4 5 8
Subject: 13   1 55.81 21 46.67 1 2 3 6 9
Subject: 14   1 43.94 19 42.22 2 1 4 5 8
Subject: 15   1 31.98 17 37.78 2 1 4 5 8
Subject: 16   1 70.93 21 46.67 1 2 3 6 9
Subject: 17   1 74.42 24 53.33 1 2 3 6 9
Subject: 18   1 62.79 17 37.78 2 2 4 6 10
Subject: 19   2 55.81 17 37.78 2 2 4 6 10
Subject: 20   2 48 26 57.78 1 2 3 6 9
Subject: 21   2 37.79 8 17.78 1 1 3 5 7
Subject: 22   2 31.98 11 24.44 1 2 3 6 9
Subject: 23   2 75 25 55.56 2 1 4 5 8
Subject: 24   2 40.16 15 33.33 1 2 3 6 9
Subject: 25   2 45.35 14 31.11 1 1 3 5 7
Subject: 26   2 40.23 10 22.22 1 1 3 5 7
Subject: 27   2 56.4 19 42.22 1 1 3 5 7
Subject: 28   2 70.93 15 33.33 1 2 3 6 9
Subject: 29   2 61.05 19 42.22 2 2 4 6 10
Subject: 30   2 47.67 18 40 1 1 3 5 7
Subject: 31   2 42.44 13 28.89 2 2 4 6 10
```

VARIABLES 1 2 3 4 5 6 7 8 9 (See identification of variables below)

1. Groups: (1) Experimental, (2) Control
2. Covariate: % score
3. Achievement score: Total correct
4. Achievement score: % score
5. Sex: (1) Male, (2) Female
6. Race: (1) Black, (2) White
7. Sex: (3) Male, (4) Female
8. Race: (5) Black, (6) White
9. Sex and Race combined: (7) Male-Black
   *(SEE FOLLOWING SIX PAGES FOR ANALYSES) (8) Female-Black
   (9) Male-White
   (10) Female-White

ANALYSIS OF VARIANCE

MALE-BLACK vs. FEMALE-BLACK

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR9 CODES:7 8

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	407.524325	1	407.524325	8.12218727	.0152
A	427.409098	1	427.409098	8.51850188	.0135
WITHIN	551.916304	11	50.1742095		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (9)	MEAN	STDV	N
7	28.2542857	9.99584891	7
8	42.5414286	7.74530685	7

Mean for entire sample:35.3978572 Standard Deviation:11.3472098 N:14

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (9)	MEAN	STDV	N
7	43.5371429	7.14069013	7
8	48.72	13.1412455	7

Mean for entire sample:46.1285715 Standard Deviation:10.5104627 N:14

Adjusted Means (adjusted for Covariate):

CODES VAR (9)	ADJUSTED MEAN
7	29.6822754
8	41.1134389

A N A L Y S I S O F V A R I A N C E

MALE-BLACK vs. MALE-WHITE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR9 CODES:7 9

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	1022.54855	1	1022.54855	10.6843747	.0061
A	196.524967	1	196.524967	2.05344419	.1729
WITHIN	1244.16557	13	95.7050438		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (9)	MEAN	STDV	N
7	28.2542857	9.99584891	7
9	44.9377778	14.4361184	9

Mean for entire sample:37.63875 Standard Deviation:14.9725829 N:16

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (9)	MEAN	STDV	N
7	43.5371429	7.14069013	7
9	57.7288889	17.4588434	9

Mean for entire sample:51.52 Standard Deviation:15.3567817 N:16

Adjusted Means (adjusted for Covariate):

CODES VAR (9)	ADJUSTED MEAN
7	33.1270402
9	41.1478577

ANALYSIS OF VARIANCE

MALE-BLACK vs. FEMALE WHITE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR9 CODES:7 10

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	942.115774	1	942.115774	21.0826834	.0008
A	7.39546524	1	7.39546524	.165495852	.6918
WITHIN	536.240527	12	44.6867106		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (9)	MEAN	STDV	N
7	28.2542857	9.99584891	7
10	37.7775	11.2049373	8

Mean for entire sample:33.3333334 Standard Deviation:11.3921599 N:15

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (9)	MEAN	STDV	N
7	43.5371429	7.14069013	7
10	53.8525	13.5248087	8

Mean for entire sample:49.0386667 Standard Deviation:11.9032742 N:15

Adjusted Means (adjusted for Covariate):

CODES VAR (9)	ADJUSTED MEAN
7	32.4939507
10	34.0677931

ANALYSIS OF VARIANCE

FEMALE-BLACK vs. MALE-WHITE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR9 CODES:8 9

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	868.653662	1	868.653662	9.74754	.0080
A	16.0244089	1	16.0244089	.179816851	.6801
WITHIN	1158.49718	13	89.1151678		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (9)	MEAN	STDV	N
8	42.5414286	7.74530685	7
9	44.9377778	14.4361184	9

Mean for entire sample:43.889375 Standard Deviation:11.689773 N:16

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (9)	MEAN	STDV	N
8	48.72	13.1412455	7
9	57.7288889	17.4588434	9

Mean for entire sample:53.7875 Standard Deviation:15.9043211 N:16

Adjusted Means (adjusted for Covariate):

CODES VAR (9)	ADJUSTED MEAN
8	45.075168
9	42.9670916

ANALYSIS OF VARIANCE

FEMALE-BLACK vs. FEMALE WHITE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR9 CODES:8 10

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	712.369571	1	712.369571	16.2387046	.0019
A	207.404267	1	207.404267	4.72785023	.0482
WITHIN	526.423445	12	43.8686205		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (9)	MEAN	STDV	N
8	42.5414286	7.74530685	7
10	37.7775	11.2049373	8

Mean for entire sample:40.0006667 Standard Deviation:9.72302523 N:15

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (9)	MEAN	STDV	N
8	48.72	13.1412455	7
10	53.8525	13.5248087	8

Mean for entire sample:51.4573334 Standard Deviation:13.1337697 N:15

Adjusted Means (adjusted for Covariate):

CODES VAR (9)	ADJUSTED MEAN
8	44.0593704
10	36.449301

ANALYSIS OF VARIANCE

MALE-WHITE vs. FEMALE-WHITE

SUMMARY OF DESIGN

Name of Data File: BIOLOGY EXPERIMENTAL AND CONTROL
Dependent variable:4 Missing Value Code:-999999
Covariate (variable number):2
MISSING VALUE CODE:-999999

Independent variable (A): VAR9 CODES:9 10

ANALYSIS OF VARIANCE

EFFECT	SS	df	MS	F	P
Covariate	1325.55751	1	1325.55751	15.2049723	.0018
A	97.786614	1	97.786614	1.12167352	.3082
WITHIN	1220.50898	14	87.1792126		

TABLE OF MEANS AND STANDARD DEVIATIONS:

Means and Standard Deviations for Dependent Variable (Variable 4):

CODES VAR (9)	MEAN	STDV	N
9	44.9377778	14.4361184	9
10	37.7775	11.2049373	8

Mean for entire sample:41.5682353 Standard Deviation:13.1415568 N:17

Means and Standard Deviations for Covariate (Variable 2):

CODES VAR (9)	MEAN	STDV	N
9	57.7288889	17.4588434	9
10	53.8525	13.5248087	8

Mean for entire sample:55.9047059 Standard Deviation:15.3756586 N:17

Adjusted Means (adjusted for Covariate):

CODES VAR (9)	ADJUSTED MEAN
9	43.848701
10	39.0027115

APPENDIX E

QUESTIONNAIRES WITH AVERAGE RESPONSES

NAME SAMPLE COPY
write clearly

QUESTIONNAIRE

REGARDING: Sign language interaction during STUDENT TEACHERS student teaching experiences as a deaf teacher who uses sign language and an interpreter as a main means of communication.

DIRECTIONS: PLEASE RESPOND TO THE FOLLOWING QUESTIONS IN AN HONEST, NON-BIASED WAY. YOUR RESPONSES ON THIS QUESTIONNAIRE WILL IN NO WAY EFFECT YOUR GRADE IN THIS COURSE.

THE FOLLOWING CONTINUUM SHOULD BE USED IN DETERMINING THE VALUES FOR YOUR NON-BIASED OPINIONS.

1	2	3	4	5
NONE	LOW	MODERATE	HIGH	HIGHEST

QUESTIONS: WHAT EFFECT DID SIGN LANGUAGE LESSONS BY THE TEACHER HAVE ON EACH OF THE FOLLOWING: (CIRCLE ONE NUMBER FOR EACH QUESTION AFTER CAREFULLY WEIGHING YOUR THOUGHTS)

1. YOUR OVERALL ACHIEVEMENT IN BIOLOGY. 1 2 3 4 5
2. YOUR UNDERSTANDING OF SIGN LANGUAGE. 1 2 3 4 5
3. YOUR UNDERSTANDING OF STUDENT TEACHER. 1 2 3 4 5
4. YOUR UNDERSTANDING OF THE SUBJECT MATTER. 1 2 3 4 5
5. AN ENJOYABLE EXPERIENCE. 1 2 3 4 5
6. MOTIVATION TO LEARN SUBJECT MATTER. 1 2 3 4 5
7. FRIENDLINESS TOWARD THE STUDENT TEACHER. 1 2 3 4 5
8. MOTIVATION TO LEARN MORE SIGN LANGUAGE. 1 2 3 4 5
9. MOTIVATION TO USE SIGN LANGUAGE WITH PEERS. 1 2 3 4 5
10. MOTIVATION TO USE SIGN LANGUAGE IN COMMUNICATING WITH STUDENT TEACHER. 1 2 3 4 5
11. IF YOU HAD MORE TIME TO LEARN SIGN LANGUAGE WHAT POSITIVE EFFECT DO YOU THINK IT WOULD HAVE ON YOUR BIOLOGY ACHIEVEMENT IF TAUGHT BY STUDENT TEACHER. 1 2 3 4 5

THANK YOU FOR YOUR HONEST OPINIONS.

NAME ALL STUDENTS COMBINED
write clearly.

QUESTIONNAIRE
(WITH NO SIGNATURES)

REGARDING: Sign language interaction during STUDENT TEACHERS student teaching experiences as a deaf teacher who uses sign language and an interpreter as a main means of communication.

DIRECTIONS: PLEASE RESPOND TO THE FOLLOWING QUESTIONS IN AN HONEST, NON-BIASED WAY. YOUR RESPONSES ON THIS QUESTIONNAIRE WILL IN NO WAY EFFECT YOUR GRADE IN THIS COURSE.

THE FOLLOWING CONTINUUM SHOULD BE USED IN DETERMINING THE VALUES FOR YOUR NON-BIASED OPINIONS.

1 NONE — 2 LOW — 3 MODERATE — 4 HIGH — 5 HIGHEST

QUESTIONS: WHAT EFFECT DID SIGN LANGUAGE LESSONS BY THE TEACHER HAVE ON EACH OF THE FOLLOWING: (CIRCLE ONE NUMBER FOR EACH QUESTION AFTER CAREFULLY WEIGHING YOUR THOUGHTS)

AVERAGE RESPONSES		
2.444	1.	YOUR OVERALL ACHIEVEMENT IN BIOLOGY. 1 2 3 4 5
3.278	2.	YOUR UNDERSTANDING OF SIGN LANGUAGE. 1 2 3 4 5
3.389	3.	YOUR UNDERSTANDING OF STUDENT TEACHER. 1 2 3 4 5
2.667	4.	YOUR UNDERSTANDING OF THE SUBJECT MATTER. 1 2 3 4 5
4.000	5.	AN ENJOYABLE EXPERIENCE. 1 2 3 4 5
2.889	6.	MOTIVATION TO LEARN SUBJECT MATTER. 1 2 3 4 5
4.056	7.	FRIENDLINESS TOWARD THE STUDENT TEACHER. 1 2 3 4 5
3.667	8.	MOTIVATION TO LEARN MORE SIGN LANGUAGE. 1 2 3 4 5
3.056	9.	MOTIVATION TO USE SIGN LANGUAGE WITH PEERS. 1 2 3 4 5
3.500	10.	MOTIVATION TO USE SIGN LANGUAGE IN COMMUNICATING WITH STUDENT TEACHER. 1 2 3 4 5
3.611	11.	IF YOU HAD MORE TIME TO LEARN SIGN LANGUAGE WHAT POSITIVE EFFECT DO YOU THINK IT WOULD HAVE ON YOUR BIOLOGY ACHIEVEMENT IF TAUGHT BY STUDENT TEACHER. 1 2 3 4 5

THANK YOU FOR YOUR HONEST OPINIONS.

NAME ALL STUDENTS COMBINED
write clearly

QUESTIONNAIRE
(WITH SIGNATURES)

REGARDING: Sign language interaction during STUDENT TEACHERS student teaching experiences as a deaf teacher who uses sign language and an interpreter as a main means of communication.

DIRECTIONS: PLEASE RESPOND TO THE FOLLOWING QUESTIONS IN AN HONEST, NON-BIASED WAY. YOUR RESPONSES ON THIS QUESTIONNAIRE WILL IN NO WAY EFFECT YOUR GRADE IN THIS COURSE.

THE FOLLOWING CONTINUUM SHOULD BE USED IN DETERMINING THE VALUES FOR YOUR NON-BIASED OPINIONS.

1	2	3	4	5
NONE	LOW	MODERATE	HIGH	HIGHEST

QUESTIONS: WHAT EFFECT DID SIGN LANGUAGE LESSONS BY THE TEACHER HAVE ON EACH OF THE FOLLOWING: (CIRCLE ONE NUMBER FOR EACH QUESTION AFTER CAREFULLY WEIGHING YOUR THOUGHTS)

AVERAGE RESPONSES		
2.556	1.	YOUR OVERALL ACHIEVEMENT IN BIOLOGY. 1 2 3 4 5
3.333	2.	YOUR UNDERSTANDING OF SIGN LANGUAGE. 1 2 3 4 5
3.444	3.	YOUR UNDERSTANDING OF STUDENT TEACHER. 1 2 3 4 5
2.833	4.	YOUR UNDERSTANDING OF THE SUBJECT MATTER. 1 2 3 4 5
3.889	5.	AN ENJOYABLE EXPERIENCE. 1 2 3 4 5
2.833	6.	MOTIVATION TO LEARN SUBJECT MATTER. 1 2 3 4 5
4.222	7.	FRIENDLINESS TOWARD THE STUDENT TEACHER. 1 2 3 4 5
3.500	8.	MOTIVATION TO LEARN MORE SIGN LANGUAGE. 1 2 3 4 5
2.611	9.	MOTIVATION TO USE SIGN LANGUAGE WITH PEERS. 1 2 3 4 5
3.444	10.	MOTIVATION TO USE SIGN LANGUAGE IN COMMUNICATING WITH STUDENT TEACHER. 1 2 3 4 5
3.500	11.	IF YOU HAD MORE TIME TO LEARN SIGN LANGUAGE WHAT POSITIVE EFFECT DO YOU THINK IT WOULD HAVE ON YOUR BIOLOGY ACHIEVEMENT IF TAUGHT BY STUDENT TEACHER. 1 2 3 4 5

THANK YOU FOR YOUR HONEST OPINIONS.

NAME ALL BLACKS COMBINED
write clearly

QUESTIONNAIRE

(WITH SIGNATURES)

REGARDING: Sign language interaction during STUDENT TEACHERS student teaching experiences as a deaf teacher who uses sign language and an interpreter as a main means of communication.

DIRECTIONS: PLEASE RESPOND TO THE FOLLOWING QUESTIONS IN AN HONEST, NON-BIASED WAY. YOUR RESPONSES ON THIS QUESTIONNAIRE WILL IN NO WAY EFFECT YOUR GRADE IN THIS COURSE.

THE FOLLOWING CONTINUUM SHOULD BE USED IN DETERMINING THE VALUES FOR YOUR NON-BIASED OPINIONS.

1 NONE — 2 LOW — 3 MODERATE — 4 HIGH — 5 HIGHEST

QUESTIONS: WHAT EFFECT DID SIGN LANGUAGE LESSONS BY THE TEACHER HAVE ON EACH OF THE FOLLOWING: (CIRCLE ONE NUMBER FOR EACH QUESTION AFTER CAREFULLY WEIGHING YOUR THOUGHTS)

AVERAGE RESPONSES		
2.5-2.0-2.38	1.	YOUR OVERALL ACHIEVEMENT IN BIOLOGY. 1 2 3 4 5
3.0-2.0-2.75	2.	YOUR UNDERSTANDING OF SIGN LANGUAGE. 1 2 3 4 5
3.5-2.5-3.25	3.	YOUR UNDERSTANDING OF STUDENT TEACHER. 1 2 3 4 5
3.0-2.5-2.88	4.	YOUR UNDERSTANDING OF THE SUBJECT MATTER. 1 2 3 4 5
4.0-2.0-3.50	5.	AN ENJOYABLE EXPERIENCE. 1 2 3 4 5
2.83-2.0-2.63	6.	MOTIVATION TO LEARN SUBJECT MATTER. 1 2 3 4 5
4.33-3.0-4.00	7.	FRIENDLINESS TOWARD THE STUDENT TEACHER. 1 2 3 4 5
3.5-2.0-3.13	8.	MOTIVATION TO LEARN MORE SIGN LANGUAGE. 1 2 3 4 5
2.83-1.5-2.50	9.	MOTIVATION TO USE SIGN LANGUAGE WITH PEERS. 1 2 3 4 5
3.0-3.0-3.0	10.	MOTIVATION TO USE SIGN LANGUAGE IN COMMUNICATING WITH STUDENT TEACHER. 1 2 3 4 5
3.0-2.0-2.75	11.	IF YOU HAD MORE TIME TO LEARN SIGN LANGUAGE WHAT POSITIVE EFFECT DO YOU THINK IT WOULD HAVE ON YOUR BIOLOGY ACHIEVEMENT IF TAUGHT BY STUDENT TEACHER. 1 2 3 4 5

FEMALES MALES COMBINED

THANK YOU FOR YOUR HONEST OPINIONS.

NAME ALL WHITES COMBINED
write clearly

QUESTIONNAIRE
(WITH SIGNATURES)

REGARDING: Sign language interaction during STUDENT TEACHERS student teaching experiences as a deaf teacher who uses sign language and an interpreter as a main means of communication.

DIRECTIONS: PLEASE RESPOND TO THE FOLLOWING QUESTIONS IN AN HONEST, NON-BIASED WAY. YOUR RESPONSES ON THIS QUESTIONNAIRE WILL IN NO WAY EFFECT YOUR GRADE IN THIS COURSE.

THE FOLLOWING CONTINUUM SHOULD BE USED IN DETERMINING THE VALUES FOR YOUR NON-BIASED OPINIONS.

1 NONE — 2 LOW — 3 MODERATE — 4 HIGH — 5 HIGHEST

QUESTIONS: WHAT EFFECT DID SIGN LANGUAGE LESSONS BY THE TEACHER HAVE ON EACH OF THE FOLLOWING: (CIRCLE ONE NUMBER FOR EACH QUESTION AFTER CAREFULLY WEIGHING YOUR THOUGHTS)

AVERAGE RESPONSES			
2.50-2.83-2.70	1.	YOUR OVERALL ACHIEVEMENT IN BIOLOGY.	1 2 3 4 5
4.00-3.67-3.80	2.	YOUR UNDERSTANDING OF SIGN LANGUAGE.	1 2 3 4 5
4.00-3.33-3.60	3.	YOUR UNDERSTANDING OF STUDENT TEACHER.	1 2 3 4 5
3.00-2.67-2.80	4.	YOUR UNDERSTANDING OF THE SUBJECT MATTER.	1 2 3 4 5
3.75-4.50-4.20	5.	AN ENJOYABLE EXPERIENCE.	1 2 3 4 5
3.50-2.67-3.00	6.	MOTIVATION TO LEARN SUBJECT MATTER.	1 2 3 4 5
4.25-4.50-4.40	7.	FRIENDLINESS TOWARD THE STUDENT TEACHER.	1 2 3 4 5
4.25-3.50-3.80	8.	MOTIVATION TO LEARN MORE SIGN LANGUAGE.	1 2 3 4 5
3.75-2.00-2.70	9.	MOTIVATION TO USE SIGN LANGUAGE WITH PEERS.	1 2 3 4 5
4.00-3.67-3.50	10.	MOTIVATION TO USE SIGN LANGUAGE IN COMMUNICATING WITH STUDENT TEACHER.	1 2 3 4 5
4.25-4.00-4.10	11.	IF YOU HAD MORE TIME TO LEARN SIGN LANGUAGE WHAT POSITIVE EFFECT DO YOU THINK IT WOULD HAVE ON YOUR BIOLOGY ACHIEVEMENT IF TAUGHT BY STUDENT TEACHER.	1 2 3 4 5

FEMALES
MALES
COMBINED

THANK YOU FOR YOUR HONEST OPINIONS.

APPENDIX F

QUESTIONNAIRE DATA ON SUBJECTS

Name of Data File: Average Responses from Questionnaires

Subject: 1	2.44	2.56	2.38	2	2.5	2.7	2.83	2.5
Subject: 2	3.28	3.33	2.75	2	3	3.8	3.67	4
Subject: 3	3.39	3.44	3.25	2.5	3.5	3.6	3.33	4
Subject: 4	2.67	2.83	2.88	2.5	3	2.8	2.67	3
Subject: 5	4	3.89	3.5	2	4	4.2	4.5	3.75
Subject: 6	2.89	2.83	2.63	2	2.83	3	2.67	3.5
Subject: 7	4.06	4.22	4	3	4.33	4.4	4.5	4.25
Subject: 8	3.67	3.5	3.13	2	3.5	3.8	3.5	4.25
Subject: 9	3.06	2.61	2.5	1.5	2.83	2.7	2	3.75
Subject: 10	3.5	3.44	3	3	3	3.5	3.67	4
Subject: 11	3.61	3.5	2.75	2	3	4.1	4	4.25

VARIABLES 1 2 3 4 5 6 7 8 (See identification of variables below)

1. All students-no names
2. All students-names
3. All blacks-names
4. Male blacks-names
5. Female blacks-names
6. All whites-names
7. Male whites-names
8. Female whites-names

*NOTE: No names refers to the unsigned questionnaires.
Names refers to the signed questionnaires.

*NOTE: See following pages in this Appendix for analyses of comparisons between above eight variables.

* * * * * CORRELATION (PEARSON R) * * * * *

EXPERIMENTAL QUESTIONNAIRE DATA

File Name: EXPERIMENTAL GROUP QUESTIONNAIRE: 8 MISS. =-999999 LL =1
UL =11

var: 1 and var: 1

M1=3.32454545 M2=3.32454545
S1=.520064666 S2=.520064666
N1=11 N2=11
r(9)=1

---

var: 1 and var: 2

M1=3.32454545 M2=3.28636364
S1=.520064666 S2=.527072535
N1=11 N2=11
r(9)=.94220015 t= 8.43634003 p= .0008

---

var: 1 and var: 3

M1=3.32454545 M2=2.97909091
S1=.520064666 S2=.472788629
N1=11 N2=11
r(9)=.811062339 t= 4.15958041 p= .0027

---

var: 1 and var: 4

M1=3.32454545 M2=2.22727273
S1=.520064666 S2=.467099357
N1=11 N2=11
r(9)=.308179876 t= .971840971 p= .3588

---

var: 1 and var: 5

M1=3.32454545 M2=3.22636364
S1=.520064666 S2=.548912973
N1=11 N2=11
r(9)=.847787775 t= 4.79576168 p= .0012

---

var: 1 and var: 6

M1=3.32454545 M2=3.50909091
S1=.520064666 S2=.62202017
N1=11 N2=11
r(9)=.926624871 t= 7.39353592 p= .0001

---

var: 1 and var: 7

M1=3.32454545 M2=3.39454545
S1=.520064666 S2=.793162828
N1=11 N2=11
r(9)=.838353097 t= 4.61370763 p= .0015

---

var: 1 and var: 8

M1=3.32454545 M2=3.75
S1=.520064666 S2=.559016995
N1=11 N2=11
r(9)=.838421229 t= 4.61496975 p= .0015

---

var: 2 and var: 1

M1=3.28636364 M2=3.32454545
S1=.527072535 S2=.520064666
N1=11 N2=11
r(9)=.94220015 t= 8.43634003 p= .0008

---

var: 2 and var: 2

M1=3.28636364 M2=3.28636364
S1=.527072535 S2=.527072535
N1=11 N2=11
r(9)=1

---

var: 2 and var: 3

1=3.28636364 M2=2.97909091
S1=.527072535 S2=.472788629
N1=11 N2=11
r(9)=.902696112 t= 6.29380113 p= .0003

---

var: 2 and var: 4

M1=3.28636364 M2=2.22727273
S1=.527072535 S2=.467099357
N1=11 N2=11
r(9)=.517512389 t= 1.81439901 p= .1005

---

var: 2 and var: 5

M1=3.28636364 M2=3.22636364
S1=.527072535 S2=.548912973
N1=11 N2=11
r(9)=.893398951 t= 5.96574777 p= .0004

---

var: 2 and var: 6

M1=3.28636364 M2=3.50909091
S1=.527072535 S2=.62202017
N1=11 N2=11
r(9)=.961831954 t= 10.5448303 p= .0003

---

var: 2 and var: 7

M1=3.28636364 M2=3.39454545
S1=.527072535 S2=.793162828
N1=11 N2=11
r(9)=.935352525 t= 7.93306023 p= .0001

---

var: 2 and var: 8

M1=3.28636364 M2=3.75
S1=.527072535 S2=.559016995
N1=11 N2=11
r(9)=.723758456 t= 3.14653238 p= .0115

---

var: 3 and var: 1

M1=2.97909091 M2=3.32454545
S1=.472788629 S2=.520064666
N1=11 N2=11
r(9)=.811062339 t= 4.15958041 p= .0027

---

var: 3 and var: 2

M1=2.97909091 M2=3.28636364
S1=.472788629 S2=.527072535
N1=11 N2=11
r(9)=.902696112 t= 6.29380113 p= .0003

---

var: 3 and var: 3

M1=2.97909091 M2=2.97909091
S1=.472788629 S2=.472788629
N1=11 N2=11
r(9)=.99999999 t= 21481.6811 p= .0000

---

var: 3 and var: 4

M1=2.97909091 M2=2.22727273
S1=.472788629 S2=.467099357
N1=11 N2=11
r(9)=.619125729 t= 2.36520616 p= .0406

---

var: 3 and var: 5

M1=2.97909091 M2=3.22636364
S1=.472788629 S2=.548912973
N1=11 N2=11
r(9)=.974863403 t= 13.1263279 p= .0001

---

var: 3 and var: 6

M1=2.97909091 M2=3.50909091
S1=.472788629 S2=.62202017
N1=11 N2=11
r(9)=.767158498 t= 3.58788411 p= .0059

---

var: 3 and var: 7

M1=2.97909091 M2=3.39454545
S1=.472788629 S2=.793162828
N1=11 N2=11
r(9)=.756762076 t= 3.4730297 p= .0070

---

var: 3 and var: 8

M1=2.97909091 M2=3.75
S1=.472788629 S2=.559016995
N1=11 N2=11
r(9)=.52876145 t= 1.86892026 p= .0920

---

var: 4 and var: 1

M1=2.22727273 M2=3.32454545
S1=.467099357 S2=.520064666
N1=11 N2=11
r(9)=.308179876 t= .971840971 p= .3588

---

var: 4 and var: 2

M1=2.22727273 M2=3.28636364
S1=.467099357 S2=.527072535
N1=11 N2=11
r(9)=.517512389 t= 1.81439901 p= .1005

---

var: 4 and var: 3

M1=2.22727273 M2=2.97909091
S1=.467099357 S2=.472788629
N1=11 N2=11
r(9)=.619125729 t= 2.36520616 p= .0406

---

var: 4 and var: 4

M1=2.22727273 M2=2.22727273
S1=.467099357 S2=.467099357
N1=11 N2=11
r(9)=1

---

var: 4 and var: 5

1=2.22727273 M2=3.22636364
S1=.467099357 S2=.548912973
N1=11 N2=11
r(9)=.428667786 t= 1.42341691 p= .1863

var: 4 and var: 6

M1=2.22727273 M2=3.50909091
S1=.467099357 S2=.62202017
N1=11 N2=11
r(9)=.336358221 t= 1.07150696 p= .3126

---

var: 4 and var: 7

M1=2.22727273 M2=3.39454545
S1=.467099357 S2=.793162828
N1=11 N2=11
r(9)=.454440119 t= 1.53048396 p= .1579

---

var: 4 and var: 8

M1=2.22727273 M2=3.75
S1=.467099357 S2=.559016995
N1=11 N2=11
r(9)=.191485427 t= .585286744 p= .5779

---

var: 5 and var: 1

M1=3.22636364 M2=3.32454545
S1=.548912973 S2=.520064666
N1=11 N2=11
r(9)=.847787775 t= 4.79576168 p= .0012

---

var: 5 and var: 2

M1=3.22636364 M2=3.28636364
S1=.548912973 S2=.527072535
N1=11 N2=11
r(9)=.893398951 t= 5.96574777 p= .0004

---

var: 5 and var: 3

M1=3.22636364 M2=2.97909091
S1=.548912973 S2=.472788629
N1=11 N2=11
r(9)=.974863403 t= 13.1263279 p= .0001

---

var: 5 and var: 4

M1=3.22636364 M2=2.22727273
S1=.548912973 S2=.467099357
N1=11 N2=11
r(9)=.428667786 t= 1.42341691 p= .1863

---

var: 5 and var: 5

M1=3.22636364 M2=3.22636364
S1=.548912973 S2=.548912973
N1=11 N2=11
r(9)=1

---

var: 5 and var: 6

M1=3.22636364 M2=3.50909091
S1=.548912973 S2=.62202017
N1=11 N2=11
r(9)=.789422348 t= 3.85805223 p= .0041

---

var: 5 and var: 7

M1=3.22636364 M2=3.39454545
S1=.548912973 S2=.793162828
N1=11 N2=11
r(9)=.743879237 t= 3.3392051 p= .0086

---

var: 5 and var: 8

M1=3.22636364 M2=3.75
S1=.548912973 S2=.559016995
N1=11 N2=11
r(9)=.556457798 t= 2.00917303 p= .0731

---

var: 6 and var: 1

M1=3.50909091 M2=3.32454545
S1=.62202017 S2=.520064666
N1=11 N2=11
r(9)=.926624871 t= 7.39353592 p= .0001

---

var: 6 and var: 2

M1=3.50909091 M2=3.28636364
S1=.62202017 S2=.527072535
N1=11 N2=11
r(9)=.961831954 t= 10.5448303 p= .0003

---

var: 6 and var: 3

M1=3.50909091 M2=2.97909091
S1=.62202017 S2=.472788629
N1=11 N2=11
r(9)=.767158498 t= 3.58788411 p= .0059

---

var: 6 and var: 4

M1=3.50909091 M2=2.22727273
S1=.62202017 S2=.467099357
N1=11 N2=11
r(9)=.336358221 t= 1.07150696 p= .3126

---

var: 6 and var: 5

M1=3.50909091 M2=3.22636364
S1=.62202017 S2=.548912973
N1=11 N2=11
r(9)=.789422348 t= 3.85805223 p= .0041

---

var: 6 and var: 6

M1=3.50909091 M2=3.50909091
S1=.62202017 S2=.62202017
N1=11 N2=11
r(9)=.999999977 t= 14091.5344 p= .0000

---

var: 6 and var: 7

M1=3.50909091 M2=3.39454545
S1=.62202017 S2=.793162828
N1=11 N2=11
r(9)=.947890859 t= 8.92565967 p= .0006

---

var: 6 and var: 8

M1=3.50909091 M2=3.75
S1=.62202017 S2=.559016995
N1=11 N2=11
r(9)=.762107804 t= 3.53127329 p= .0065

---

var: 7 and var: 1

M1=3.39454545 M2=3.32454545
S1=.793162823 S2=.520064666
N1=11 N2=11
r(9)=.838353097 t= 4.61370763 p= .0015

---

var: 7 and var: 2

M1=3.39454545 M2=3.28636364
S1=.793162828 S2=.527072535
N1=11 N2=11
r(9)=.935352525 t= 7.93306023 p= .0001

---

var: 7 and var: 3

M1=3.39454545 M2=2.97909091
S1=.793162828 S2=.472788629
N1=11 N2=11
r(9)=.756762076 t= 3.4730297 p= .0070

---

var: 7 and var: 4

M1=3.39454545 M2=2.22727273
S1=.793162828 S2=.467099357
N1=11 N2=11
r(9)=.454440119 t= 1.53048396 p= .1579

---

var: 7 and var: 5

M1=3.39454545 M2=3.22636364
S1=.793162828 S2=.548912973
N1=11 N2=11
r(9)=.743879237 t= 3.3392051 p= .0086

---

var: 7 and var: 6

M1=3.39454545 M2=3.50909091
S1=.793162828 S2=.62202017
N1=11 N2=11
r(9)=.947890859 t= 8.92565967 p= .0006

---

var: 7 and var: 7

M1=3.39454545 M2=3.39454545
S1=.793162828 S2=.793162828
N1=11 N2=11
r(9)=1

---

var: 7 and var: 8

M1=3.39454545 M2=3.75
S1=.793162828 S2=.559016995
N1=11 N2=11
r(9)=.554814431 t= 2.00059502 p= .0741

---

var: 8 and var: 1

M1=3.75 M2=3.32454545
S1=.559016995 S2=.520064666
N1=11 N2=11
r(9)=.838421229 t= 4.61496975 p= .0015

---

var: 8 and var: 2

M1=3.75 M2=3.28636364
S1=.559016995 S2=.527072535
N1=11 N2=11
r(9)=.723758456 t= 3.14653238 p= .0115

---

var: 8 and var: 3

M1=3.75 M2=2.97909091
S1=.559016995 S2=.472788629
N1=11 N2=11
r(9)=.52876145 t= 1.86892026 p= .0920

---

var: 8 and var: 4 .

M1=3.75 M2=2.22727273
S1=.559016995 S2=.467099357
N1=11 N2=11
r(9)=.191485427 t= .585286744 p= .5779

---

var: 8 and var: 5

M1=3.75 M2=3.22636364
S1=.559016995 S2=.548912973
N1=11 N2=11
r(9)=.556457798 t= 2.00917302 p= .0731

---

var: 8 and var: 6

M1=3.75 M2=3.50909091
S1=.559016995 S2=.62202017
N1=11 N2=11
r(9)=.762107804 t= 3.53127328 p= .0065

---

var: 8 and var: 7

M1=3.75 M2=3.39454545
S1=.559016995 S2=.793162828
N1=11 N2=11
r(9)=.554814431 t= 2.00059502 p= .0741

---

var: 8 and var: 8

M1=3.75 M2=3.75
S1=.559016995 S2=.559016995
N1=11 N2=11
r(9)=1

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